What is claimed is:

1. A $ZrO_2$- $Al_2O_3$ composite ceramic material comprising:

a first phase of $ZrO_2$ grains containing 10 to 12 mol% of $CeO_2$ as a stabilizer and having an average grain size of 0.1μm to 1μm, said $ZrO_2$ grains composed of 90 vol% or more of tetragonal $ZrO_2$;

a second phase of $Al_2O_3$ grains having an average grain size of 0.1 to 0.5 μm, a content of said second phase in the composite ceramic material being within a range of 20 to 60 vol%;

wherein said $Al_2O_3$ grains are dispersed within said $ZrO_2$ grains at a first dispersion ratio of 2% or more, which is defined as a ratio of the number of said $Al_2O_3$ grains dispersed within said $ZrO_2$ grains relative to the number of the entire $Al_2O_3$ grains dispersed in the composite ceramic material, and

said $ZrO_2$ grains are dispersed within said $Al_2O_3$ grains at a second dispersion ratio of 1% or more, which is defined as a ratio of the number of said $ZrO_2$ grains dispersed within said $Al_2O_3$ grains relative to the number of the entire $ZrO_2$ grains dispersed in the composite ceramic material.

2. The composite ceramic material as set forth in claim 1, wherein said $ZrO_2$ grains contains 0.02 to 1 mol% of $TiO_2$.

3. The composite ceramic material as set forth in claim 1, wherein said $Al_2O_3$ grains are dispersed within said $ZrO_2$ grains at the first dispersion ratio of 4% or more.

4. A method of producing a $ZrO_2$-$Al_2O_3$ composite ceramic material, said composite

ceramic material comprising:

a first phase of $ZrO_2$ grains containing 10 to 12 mol% of $CeO_2$ as a stabilizer and having an average grain size of 0.1μm to 1μm, said $ZrO_2$ grains composed of 90 vol% or more of tetragonal $ZrO_2$;

a second phase of $Al_2O_3$ grains having an average grain size of 0.1 to 0.5 μm;

wherein said $Al_2O_3$ grains are dispersed within said $ZrO_2$ grains at a first dispersion ratio of 2% or more, which is defined as a ratio of the number of said $Al_2O_3$ grains dispersed within said $ZrO_2$ grains relative to the number of the entire $Al_2O_3$ grains dispersed in the composite ceramic material, and

said $ZrO_2$ grains are dispersed within said $Al_2O_3$ grains at a second dispersion ratio of 1% or more, which is defined as a ratio of the number of said $ZrO_2$ grains dispersed within said $Al_2O_3$ grains relative to the number of the entire $ZrO_2$ grains dispersed in the composite ceramic material,

wherein the method comprises the steps of:

preparing a first powder for providing said first phase and a second powder for providing said second phase;

mixing said first powder with said second powder such that a content of said second phase in said composite ceramic material is within a range of 20 to 60 vol%;

molding a resultant mixture in a desired shape to obtain a green compact; and

sintering said green compact at a sintering temperature in an oxygen-containing atmosphere.

5. The method as set forth in claim 4, wherein said second powder includes a $\gamma$-$Al_2O_3$ powder having a specific surface within the range of 10 to 100$m^2/g$ and a substantially spherical shape.

6. The method as set forth in claim 4, wherein said second powder is a mixture of an $\alpha$- $Al_2O_3$ powder having an average particle size of 0.3 $\mu$m or less, and a $\gamma$-$Al_2O_3$ powder having a specific surface within the range of 10 to 100$m^2$/g and a substantially spherical shape.

7. The method as set forth in claim 4, wherein said resultant mixture is calcined at a temperature of 800 °C or more and less than said sintering temperature, and then pulverized to obtain a calcined powder, and wherein said green compact of the calcined powder is sintered in the oxygen-containing atmosphere.

8. A $ZrO_2$-$Al_2O_3$ composite ceramic material comprising:

a first phase of $ZrO_2$ grains including 90 vol% or more of tetragonal $ZrO_2$, which are obtained by use of 10 to 12 mol% of $CeO_2$ as a stabilizer and 0.02 to 1 mol% of $TiO_2$, and having an average grain size of 0.1$\mu$m to 1$\mu$m; and

a second phase of $Al_2O_3$ grains having an average grain size of 0.1 to 0.5 $\mu$m;

wherein the composite ceramic material has a mutual nano-composite structure formed under a condition that a content of said second phase in the composite ceramic material is within a range of 20 to 60 vol% such that said $Al_2O_3$ grains are dispersed within said $ZrO_2$ grains at a first dispersion ratio of 4% or more, which is defined as a ratio of the number of said $Al_2O_3$ grains dispersed within said $ZrO_2$ grains relative to the number of the entire $Al_2O_3$ grains dispersed in the composite ceramic material, and said $ZrO_2$ grains are dispersed within said $Al_2O_3$ grains at a second dispersion ratio of 1% or more, which is defined as a ratio of the number of said $ZrO_2$ grains dispersed within said $Al_2O_3$ grains relative to the number of the entire $ZrO_2$ grains dispersed in the composite ceramic material.